

CLAIMS

1. An apparatus useable for circulatory isolation and treatment of a part of a patient's body **characterised in** that said apparatus comprises:
 - 5 - a fluid circulation loop having a first (132) and a second end (140);
 - obstructing means capable of obstructing a blood flow in a patient's blood vessel such that a body part, extremity or organ becomes circulatorily isolated from the circulation of the rest of the body;
 - flow-through means comprising a first and a second flow-through member
10 connectable to said first (132) and second (140) end of said fluid circulation loop, respectively, for providing said part of the patient's body with a fluid connection to the fluid circulation loop, making it possible to circulate a therapeutic fluid through said body part.
- 15 2. The apparatus as recited in claim 1, where said obstruction means comprises:
 - compressing means (205) with a height (h), applicable around said extremity devised to compress a section of said extremity and thereby circulatorily isolate the patient's extremity and prevent a leakage of a fluid, that can be blood or a therapeutic liquid, from said extremity to the rest of the patients circulation;
 - 20 - catheters (201, 202), having a reinforced section (305) with a length (L) greater than the height (h) of said compressing means (205), devised for being introduced in an artery and in a vein having connection to said extremity.
- 25 3. The apparatus as recited in claim 1, where said obstruction means comprises balloon catheters, said catheters being capable of obstructing the blood flow in a patient's blood vessels leading to and from an isolated part or organ of the body, such that said part or organ becomes circulatory isolated from the rest of the body.
- 30 4. The apparatus as recited in claim 1, **characterised in** that said apparatus further comprises:
 - pump means (101) devised for circulating a fluid in said fluid circulating loop and said catheters.
- 35 5. The apparatus as recited in claim 4, **characterised in** that said therapeutic fluid has a composition that makes said fluid possible to oxygenate and that said apparatus also comprises an oxygenator unit (108) capable of oxygenating blood and said therapeutic fluid for the purpose of supplying said extremity with oxygen during a prolonged period of time.

6. The apparatus as recited in claim 5, **characterised in** that said apparatus further comprises a heat providing unit (103) connected in the fluid circulation loop, with the purpose of warming the fluid.
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7. The apparatus as recited in claim 6, **characterised in** that said apparatus comprises a control unit (199, 401) with an input unit (410) for a number of input signal lines and a output unit (411) for a number of control lines devised for controlling a number of process parameters including fluid pressure and
- 10 temperature, oxygen saturation, and the flow speed of said fluid.
8. The apparatus as recited in claim 7, **characterised in** that said circulatory unit comprises a venous reservoir with an inlet for receiving fluid coming from the patient, and an outlet connected to the pump means (101) for recycling the fluid
- 15 to the patient.
9. The apparatus as recited in claim 8, **characterised in** that it comprises a level sensor capable of measuring the height of fluid in the venous reservoir (180).
- 20 10. The apparatus as recited in claim 9, **characterised in** that said control unit (199, 401) comprises a display (414) devised for displaying trend curves and the level of fluid in the venous reservoir and time of treatment.
11. The apparatus as recited in claim 1 where said fluid circulation loop includes a
- 25 tube set which comprises a shunt connection (150) between an arterial and a venous part of the tube set, said shunt connection (150) having a valve means (152) enabling the closing and opening of said shunt connection.
12. A method for the treatment of thrombosis in a patients extremity comprising the
- 30 following steps:
- connecting the internal blood circulatory system of said extremity to an extra-corporeal circulation;
 - isolating the extremity from the rest of the patient's circulation while maintaining an extracorporeal circulation in said extremity;
 - 35 - adding a thrombolytic agent.
13. A method for the treatment of cancer in a patient's organ comprising the following steps:
- connecting the internal blood circulatory system of said organ to an extra-

- corporeal circulation;
- isolating the organ from the rest of the patient's circulation while maintaining an extracorporeal circulation of a fluid in said organ;
 - adding a chemotherapeutic agent to the fluid; and
- 5 - circulating said fluid with the agent through the organ for achieving a therapeutic effect.
14. The method as recited in claim 12 or 13, further comprising the following step:
- catheterising the patient using Seldinger technique
- 10 15. The method as recited in claim 14 where said Seldinger technique is used for positioning reinforced catheters in blood vessels passing through tissue compressed from the outside of the patients body.
- 15 16. The method as recited in claim 15, further comprising the following step:
- adding a therapeutic fluid to a fluid in said extracorporeal circulation, said fluid being blood or a therapeutic fluid or a mixture thereof.
- 20 17. The method as recited in claim 16, further comprising the following step:
- oxygenating the fluid.
18. The method as recited in claim 17, further comprising the following step:
- warming the fluid.
- 25 19. The method as recited in claim 18, where said thrombolytic agent is so effective or present in such high concentration that it could cause haemorrhage or other side effect injuries if said liquid entered the blood circulation of the brain or other sensitive organ.
- 30 20. An apparatus for treatment of a patient's extremity, **characterised in** that said apparatus comprises:
- a tourniquet-shaped compressing means (205) having a predetermined height (h);
 - an arterial catheter (202) having an elongated section (305) that is reinforced to
- 35 withstand an outside pressure and where said section have a length (L) that is greater than the height (h) of the compressing means (305);
- an venous catheter (201) likewise having an elongated section (305) that is reinforced to withstand an outside pressure and where said section have a length (L) that is greater than the height (h) of the compressing means (305).

21. A fluid circulation loop comprising a tube connectable to a patients blood vessel system and useable for altering certain properties of a fluid circulating in said patient, having a first end (132) and a second end (140) connectable to a patient,
5 **characterised by a shunt connection (150).**
22. The fluid circulation loop as recited in claim 21 **characterised in that** said shunt connection (150) is connected between a part of the loop which is close to the first end (132) and a part of the loop which is close to the second end (140)
10 of the loop, and in that said shunt connection comprises a valve means (152) that enables the closing and opening of said shunt connection.
23. The fluid circulation loop as recited in claim 22 **characterised by an arterial** valve means (118) connected in the loop further closer to the first end (132) than
15 the shunt connection (150), and a venous valve means (142) connected in the loop further closer to the second end (140) than the shunt connection (150) enabling the opening and closing of fluid connection to the patients body.
24. The fluid circulation loop as recited in claim 23 **characterised by means for** removal of fluid from the loop by a Y-connector (155) and associated valves
20 (161,171)
25. The fluid circulation loop as recited in claim 24 **characterised by means for** adding fluid to the loop by a Y-connector (188), or a valve (184) that adds fluid
25 to a venous reservoir (180) when open.
26. The fluid circulation loop as recited in claim 25 **characterised in that it** comprises a pump, a heater and an oxygenator.